

CHRISTOPHER HUBBARD

LBNL, 1 Cyclotron Road, MS 64-121, Berkeley, CA 94720, USA

Email: cghubbard@lbl.gov

Tel: +1 510 495 8148

Research Interests

My current research focus is **electrical (bio)geophysics**, investigating (bio)geochemically induced electrical signatures in porous media. I am an **environmental geochemist** by training with a broad interest in isotope geochemistry, contaminant transport and retardation processes. My research has spanned well-constrained lab experiments (e.g. U(VI) sorption, University of Bristol), more complex column experiments (biogeophysics, University of Leeds and LBNL) and field investigations (acid mine drainage, University of Reading).

Employment Record

Sep 2011 - present

Lawrence Berkeley National Laboratory (LBNL), USA

Geological Project Scientist – Earth Sciences Division

I am the experimental lead on the Monitoring and Modelling component of an Energy Biosciences Institute funded research program looking at Microbially Enhanced Hydrocarbon Recovery and Biosourcing. This involves designing, performing and coordinating batch and column experiments investigating diagnostic geophysical and isotopic signatures.

Sep 2008 – Aug 2011

University of Leeds, UK

Postdoctoral Research Assistant - School of Earth and Environment

I applied laboratory-based geophysical techniques to study biogeochemically induced transformations and processes in porous media: (1) Self Potential/biogeobattery study of microbial Fe(III)-reduction in flow-through columns; (2) set-up of Spectral Induced Polarisation (SIP) instrumentation in Leeds and pilot study with polarizable minerals; (3) interpretation of electrical data from tests on tight gas sandstones at varying pressure.

Feb 2007 - May 2008

University of Bristol, UK

Postdoctoral Research Assistant - Earth Sciences

This project developed surface complexation models of U(VI) sorption on Fe/Mn (oxyhydr)oxides by modelling the results of batch experiments, taking into account crystal structures, EXAFS and *ab initio* quantum mechanical modelling of molecular geometries. My duties involved batch experiments, running the ICP-MS and data modelling.

Oct 2007 - Jan 2008

University of Reading, UK

Part-time Sessional Lecturer

I delivered a first year module on *Earth Structure and Materials* consisting of 10 lectures and practical classes, as well as marking essays and practical notebooks.

Apr 2001 – Oct 2001

Parkman Ltd. (now Mouchel Ltd.), UK

Graduate Environmental Scientist

Duties included desk studies, supervision of contaminated land site investigations, undertaking monitoring and sampling programmes and managing the office Environmental Management System.

Education

2002-2007

University of Reading, UK

PhD Environmental Geochemistry

“Acid mine drainage generation and transport processes in the Tinto River, SW Spain.” This study involved seasonal fieldwork and sample characterisation using a wide range of geochemical techniques (ICP, XRD, XRF and stable isotopes).

C. Hubbard

1999-2000

MSc Environmental Biogeochemistry

My MSc dissertation characterised catechol 2,3-dioxygenase genes involved in oil spill bioremediation.

University of Newcastle-upon-Tyne, UK

Distinction

1996-1999

BSc (Hons) Environmental Geoscience

University of Durham, UK

First

Collaborations and Professional Membership

I enjoy collaborative work with external organisations and experts. To date I have collaborated/visited with Rutgers-Newark University, NJ (SIP instrumentation); University of Manchester, UK (geomicrobiology); University of Huelva, Spain (acid mine drainage field monitoring), the Jet Propulsion Laboratory, CA (acid mine drainage isotopes), University of California Berkeley, CA (microbiology and isotopes) and Penn State (reactive transport modelling). I am a fellow of the Geological Society of London and a member of the American Geophysical Union and the Geochemical Society.

Publications

Hubbard C.G., West L.J., Rodriguez Blanco J.D., and Shaw S. (In preparation). Spectral induced polarization of charge transfer via semiconductive minerals: redox reaction of ferrous iron at the magnetite-solution interface.

Hubbard C.G., West L.J., Morris K., Kulesa B., Brookshaw D., Lloyd J.R. and Shaw S. (2011). In search of experimental evidence for the biogeobattery. *J. Geophys. Res.*, 116, G04018.

Hubbard C.G., Black S. and Coleman, M.L. (2009). Aqueous geochemistry and oxygen isotope compositions of acid mine drainage from the Río Tinto, SW Spain, highlight inconsistencies in current models. *Chem. Geol.*, 265, 321-334.

Cánovas C.R, **Hubbard C.G.**, Olias M., Nieto J.M, Black S. and Coleman M.L. (2008). Hydrochemical variations and contaminant load in the Río Tinto Spain during flood events. *J. Hydrol.* 350, 25-40.

Sherman D.M., Peacock C.L., and **Hubbard C.G.** (2008). Surface complexation of U(VI) on goethite (α -FeOOH). *Geochim. Cosmochim. Acta* 72(2), 298-310.

Sherman D.M., **Hubbard C.G.** and Peacock C.L. (2008). Surface complexation of U(VI) by Fe and Mn (hydr)oxides, In: Merkel, B.J and Hasche-Berger A. (Ed) *Uranium, Mining and Hydrogeology*, Berlin, Heidelberg: Springer.

Conference Presentations

Hubbard C., Hubbard S., Wu Y., Surasani V., Ajo-Franklin J., Commer M., Dou S., Kwon T., Li L., Fouke B. and Coates J. (2012). Toward Optimized Bioclogging and Biocementation Through Combining Advanced Geophysical Monitoring and Reactive Transport Modeling Approaches, AGU Fall Meeting, San Francisco.

Hubbard S., Wu Y., Surasani V., **Hubbard C.G.**, Ajo-Franklin J., Commer M., Dou S., Li L., Fouke B. and Coates J. (2012). Toward Optimized Microbially Enhanced Hydrocarbon Recovery through combining Advanced Geophysical Monitoring and Reactive Transport Modeling Approaches, RMF 2012 Workshop, London, UK.

Hubbard C.G., West L.J., Rodriguez-Blanco, J.D., Slater L.D., Ntarlagiannis, D. and Shaw S. (2011). The effect of pH and redox active ions on the spectral induced polarization signature of magnetite. AGU Fall Meeting, San Francisco.

- Wu Y., **Hubbard C.G.**, Dong W. and Hubbard S.S. (2011). Complex electrical monitoring of biopolymer and iron mineral precipitation for microbial enhanced hydrocarbon recovery. AGU Fall Meeting, San Francisco.
- Hubbard C.G.**, West L.J., Ntarlagiannis D., Slater L.D. and Shaw S. (2011). The influence of pore water chemistry on the mineral-water interface of iron (oxyhydr)oxides – implications for spectral induced polarization. Second International Workshop on Induced Polarization in Near-Surface Geophysics, Colorado School of Mines.
- Hubbard C.G.**, West L.J., Kulessa B., Shaw S., Morris K. (2010). Self potential - in search of the biogeobattery. 20th Annual Goldschmidt Conference, Knoxville, USA, 14th-18th June.
- West L.J., **Hubbard C.G.**, Shaw S., Morris K., Kulessa B. (2009). Comparison of non-polarising electrode designs for measuring electrical properties in biogeophysics experiments. American Geophysical Union, Fall Meeting.
- Hubbard, C.G.**, Black, S., Coleman, M., (2009). Pyrite oxidation and sulfate-oxygen isotopes - what are the missing pieces? American Geophysical Union, Fall Meeting.
- Hubbard, C.G.**, Sherman D.M. and Peacock C.L. (2008). Surface complexation modelling of U(VI) sorption on Fe/Mn (hydr)oxides. Co-ordinating Group on Environmental Radioactivity in the UK (COGER) Annual Meeting, Nottingham, UK, 7th-9th April.
- Hubbard, C.**, Black, S., Coleman, M., (2005). Geochemical processes in the Río Tinto, SW Spain: evidence from stable isotopes and aqueous geochemistry. 9th International Mine Water Association Congress, Oviedo, Spain, 5th-7th September.
- Hubbard, C.**, Black, S., Coleman, M., (2004). Source zone dynamics in the Río Tinto, SW Spain. 14th Annual Goldschmidt Conference, Copenhagen, Denmark, 5th-11th June
- Hubbard, C.**, Black, S., Coleman, M. and White, K., (2004). Assessing contaminant storage and transport in the Río Tinto mining district, SW Spain, using a remote sensing approach. Mineralogical Society, Environmental Mineralogy Group, Research in Progress Meeting, Reading University, 13th February.

References

- Dr. Susan Hubbard, Earth Sciences Division, Lawrence Berkeley National Laboratory, 1 Cyclotron Road, MS 74R-316C, Berkeley, CA, 94720, USA. Email: sshubbard@lbl.gov. Tel: +1 510 486 5266.
- Dr. Jared West, School of Earth and Environment, Maths/Earth and Environment Building, University of Leeds, Leeds, LS2 9JT, UK. Email: l.j.west@leeds.ac.uk. Tel : +44 113 343 5253.
- Prof. Dave Sherman, Department of Earth Sciences, University of Bristol, Wills Memorial Building, Queen's Road, Bristol, BS8 1RJ, UK. Email: dave.sherman@bristol.ac.uk. Tel : +44 117 954 5446.